

## The Kinetic Study of Ion Transfer Processes at Liquid/Liquid Interfaces

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The study of ion transfers at the interface between two immiscible electrolyte solutions is well established<sup>1</sup>, although information on the kinetics of the actual transfer process of the ion remains scarce.

Up until now the mass transport of the transferring ion to the electrified interface has been diffusion controlled. For kinetic study of the ion transfer at the interface the rate of mass transport needs to be greatly increased. In order to increase the rate of mass transport a cell has been developed, for liquid/liquid systems, which uses well established hydrodynamics, the obvious choice for this was the channel flow cell<sup>2</sup>.

A channel cell has been developed which has, in place of the working electrode, a small liquid interface centrally positioned in the channel floor. Voltammetric study of ion transfer at this interface under hydrodynamic conditions is being performed to understand the influence of the interfacial kinetics on the overall ion transfer process.

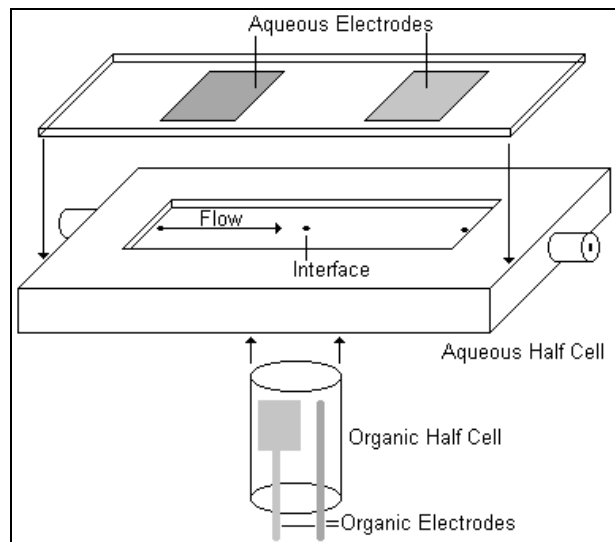
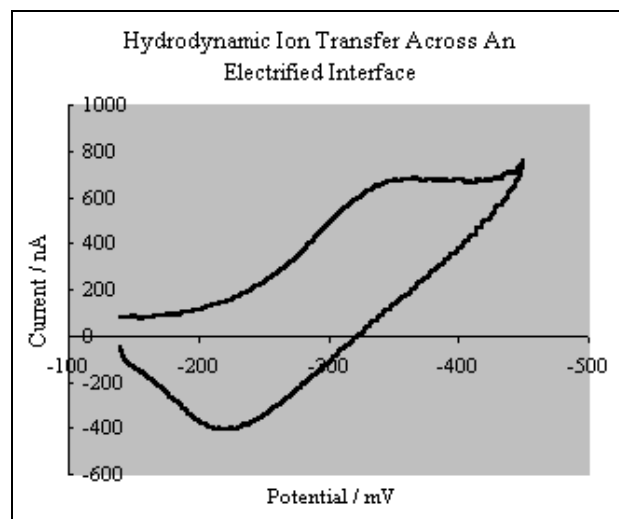


Figure 1. Schematic of the cell setup.

One of the systems we have studied has been the transfer of tetraethylammonium ions across a water/1,2-dichloroethane interface. In the setup developed to date the aqueous phase has been flowed over a stationary organic phase, an analogue of a channel flow cell with a metal electrode allowing easy calculation of the hydrodynamics and the ion transfer kinetics based upon well established work on this subject<sup>3</sup>.



Graph 1. Voltammetric response of the transfer of an ion from the flowing phase into the stationary phase, followed by the reverse process

A cell in which the two liquid phases are flowing simultaneously is also currently under development.

Using the hydrodynamic liquid/liquid system, with the knowledge of the ion transfer kinetics, it would then become possible for the calculation of the kinetics of molecular dissociation in CE systems - where the transferring ion is generated by a chemical reaction in solution, followed by an electrochemical transfer of the ion across the interface.

### References:

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